CLAIMS

I claim:

1. A method for manufacturing a plurality of resistors comprising:

a) applying a lithographic process for etching a top portion of a metal plate for precisely defining a plurality of electrode columns on said metal plate;

2. The method of claim 1 further comprising:

b) electroplating at least an electrode layer on each of said electrode columns to form an electrode for each of said electrode column; and

c) scribing said metal plate into a plurality of resistors each comprising at least two electrodes formed in step b).

3. The method of claim 1 wherein:

said step a) of applying a lithographic process for etching a top portion of a metal plate is a step of etching a top portion of a metal plate comprising nickel-copper alloy.

4. The method of claim 1 wherein:

said step b) of electroplating at least an electrode layer on each of said electrode columns is a step of electroplating a copper layer and a tin-lead alloy layer on each of said electrode columns.

5. The method of claim 1 wherein:

said step a) of applying a lithographic process for etching a top portion of a metal plate for precisely defining a plurality of electrode columns on said metal plate is a step of forming a plurality of resistors each having a precisely defined resistance ranging between one milli-ohm to one ohm.

6. The method of claim 1 wherein:

said step a) of applying a lithographic process for etching a top portion of a metal plate for precisely defining a plurality of electrode columns on said metal plate is a step of forming a plurality of resistors each having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

7. The method of claim 1 wherein:

said step a) of applying a lithographic process for etching a top portion of a metal plate for precisely defining a plurality of electrode columns on said metal plate is a step of forming said electrode columns each having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrode columns.

8. A method for manufacturing a plurality of resistors comprising:

a) applying an electroplating process for precisely forming a plurality of column-shaped electrodes on a metal plate.

9. The method of claim 7 further comprising a step:

b) scribing said metal plate into a plurality of resistors each comprising at least two electrodes formed in step a).

10. The method of claim 8 wherein:

said step a) of applying an electroplating process for precisely forming a plurality of column-shaped electrodes on a metal plate is a step of electroplating said electrodes on a metal plate comprising nickel-copper alloy.

11. The method of claim 8 wherein:

said step a) of applying an electroplating process for precisely forming a plurality of column-shaped electrodes is a step of electroplating a copper layer and a tin-lead alloy layer to form each of said electrodes.

12. The method of claim 8 wherein:

said step a) of applying an electroplating process for precisely forming a plurality of column-shaped electrodes is a step of forming a plurality of resistors each having a precisely defined resistance ranging between one milli-ohm to one ohm.

13. The method of claim 8 wherein:

said step a) of applying an electroplating process for precisely forming a plurality of column-shaped electrodes is a step of forming a plurality of resistors each having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

14. The method of claim 8 wherein:

said step a) of applying an electroplating process for precisely forming a plurality of column-shaped electrodes is a step of forming said electrodes each having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrodes.

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15. A resistor array supported on a metal plate composed of a low temperature coefficient of resistance (TCR) metallic material, said resistor array comprising:

a plurality of electrode columns composed of said low TCR metallic material disposed on said metal plate.

16. The resistor array of claim 15 further comprising:

at least an electrode layer disposed on each of said electrode columns to form an electrode for each of said electrode columns.

17. The resistor array of claim 15 further comprising:

a plurality of scribing lines for scribing said metal plate into a plurality of resistors each comprising at least two electrodes.

18. The resistor array of claim 15 wherein:

said low TCR metallic material composed of said metal plate further comprises a nickel-copper alloy.

19. The resistor array of claim 15 wherein:

said electrode layer disposed on each of said electrode columns further comprises a copper layer and a tin-lead alloy layer on each of said electrode columns.

20. The resistor array of claim 15 wherein:

said plurality of electrode columns disposed on said metal plate having a precisely defined position for providing precisely defined resistance for each of said resistors ranging between one milli-ohm to one ohm.

21. The resistor array of claim 15 wherein:

each of said plurality of resistors having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

22. The resistor array of claim 15 wherein:

each of said plurality of electrode columns on said metal plate having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrode columns.

23. A resistor array supported on a metal plate composed of a low temperature coefficient of resistance (TCR) metallic material, said resistor array comprising:

a plurality of column-shaped electroplated electrodes disposed on said metal plate composed of said low TCR metallic material.

24. The resistor array of claim 23 further comprising:

a plurality of scribing lines for scribing said metal plate into a plurality of resistors each comprising at least two electrodes.

25. The resistor array of claim 23 wherein:

said low TCR metallic material composed of said metal plate further comprises a nickel-copper alloy.

26. The resistor array of claim 23 wherein:

said plurality of column-shaped electroplated electrodes further comprises a copper layer and a tin-lead alloy layer.

27. The resistor array of claim 23 wherein:

said plurality of column-shaped electroplated electrodes disposed on said metal plate having a precisely defined position for providing precisely defined resistance for each of said resistors ranging between one milli-ohm to one ohm.

28. The resistor array of claim 23 wherein:

each of said resistors having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

29. The resistor array of claim 23 wherein:

each of said plurality of column-shaped electrodes having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrodes.

30. A resistor supported on a metal plate composed of a low temperature coefficient of resistance (TCR) metallic material, said resistor comprising:

at least two electrode columns composed of said low TCR metallic material disposed on said metal plate.

31. The resistor of claim 26 further comprising:

at least an electrode layer disposed on each of said electrode columns to form an electrode for each of said electrode columns.

32. The resistor of claim 30 wherein:

said low TCR metallic material composed of said metal plate further comprises a nickel-copper alloy.

33. The resistor of claim 30 wherein:

said electrode layer disposed on each of said electrode columns further comprises a copper layer and a tin-lead alloy layer on each of said electrode columns.

34. The resistor of claim 30 wherein:

said electrode columns disposed on said metal plate having a precisely defined position for providing precisely defined resistance for said resistor ranging between one milli-ohm to one ohm.

35. The resistor of claim 30 wherein:

said resistor having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

36. The resistor of claim 30 wherein:

each of said electrode columns on said metal plate having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrode columns.

37. A resistor supported on a metal plate composed of a low temperature coefficient of resistance (TCR) metallic material, said resistor comprising:

at least two column-shaped electroplated electrodes disposed on said metal plate composed of said low TCR metallic material.

38. The resistor of claim 37 wherein:

said low TCR metallic material composed of said metal plate further comprises a nickel-copper alloy.

39. The resistor of claim 37 wherein:

said column-shaped electroplated electrodes further comprises a copper layer and a tin-lead alloy layer.

40. The resistor of claim 37 wherein:

said column-shaped electroplated electrodes disposed on said metal plate having a precisely defined position for providing precisely defined resistance for said resistor ranging between one milli-ohm to one ohm.

41. The resistor of claim 37 wherein:

said resistor having a thickness ranging between 0.05 to 0.5 millimeters and a length ranging between 1.0 to 7.0 millimeters.

42. The resistor of claim 37 wherein:

each of said column-shaped electrodes having a width and length ranging between 0.1 to 3.2 millimeter, a height ranging between 0.05 to 0.5 millimeters and distance ranging between 0.4 to 6.2 millimeters between every two electrodes.